



DATA SHEET

Min-Econ
Amplifiers

C-COR Electronics, Inc.

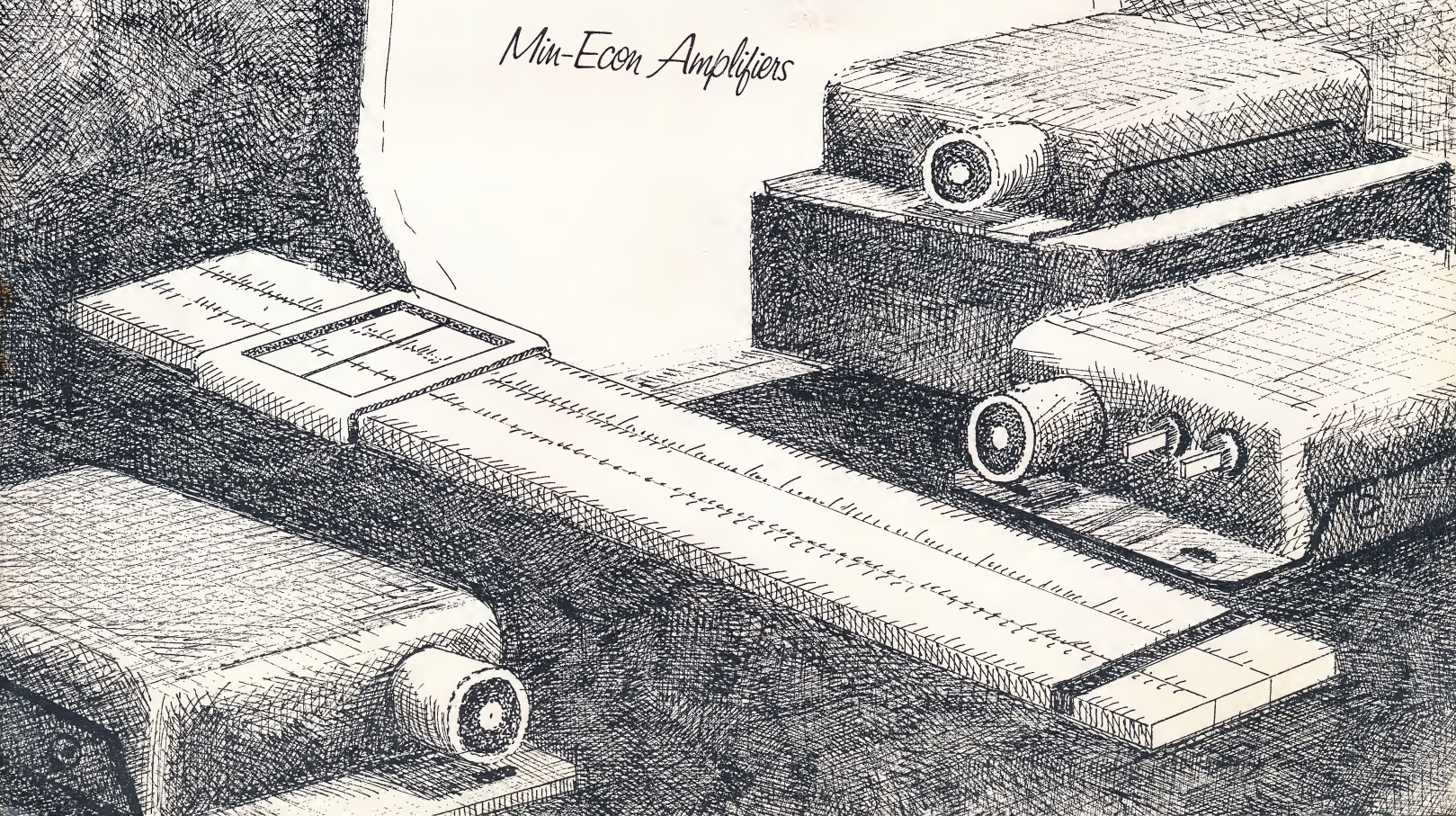
POST OFFICE BOX 824 • STATE COLLEGE, PENNA. 16801 • PHONE 814 - 238 - 2461

PROJECT X2948
AMPLIFIER SPECIFICATIONS:

- SMALL *Mini-Econ Amplifier*
- RUGGED *Industrial Grade*
- LOW COST *Manufacturing*

Solution —
(Answer) ...

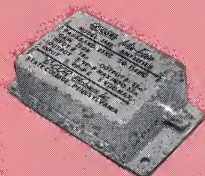
Min-Econ Amplifiers



THE *Min-Econ* AMPLIFIER CONCEPT

The C-COR Min-Econ amplifier concept is to provide a wide variety of models in a small, standardized package. All of the units use silicon transistors, in laboratory-proven circuits, with high-quality components throughout. In bridging the gap between sub-miniature, or integrated amplifiers, and conventional designs, these amplifiers are all capable of substantial output levels, and are all economically priced. While certain Min-Econ units are intended for specific purposes, all have a multitude of applications in the laboratory and in systems work.

Special modifications of the units in this brochure are available, and we can also use the Min-Econ package for other special designs. Come to us with your amplifier problems.



**SMALL
RUGGED
VERSATILE
LOW-COST**

C-COR *Min-Econ Amplifiers*

UNIVERSAL WIDE-BAND AMPLIFIERS

Both the C-COR Model 3580, and Model 3581 Min-Econ amplifiers are low-pass, high-output amplifiers suitable for a variety of laboratory and system applications. Applications include amplification of fast pulses, such as those encountered in photomultiplier and high-resolution video circuits, as well as amplification of multi-channel sine wave signals.

SPECIFICATIONS

	Model 3580	Model 3581
3 db PASSBAND	25 kc-150 mc	20 cps-60 mc
GAIN	20 db	20 db
INPUT AND OUTPUT Z	50 ohms nom	75 ohms nom
OUTPUT CAPABILITY	1 volt p-p into matched load	
NOISE AND HUM	35 μ v max	20 μ v max
RISE TIME	4 ns max	8 ns max
TEMPERATURE RANGE	-20°C to +70°C	0°C to +50°C
POWER REQUIRED	+15 vdc @ 40 ma nom	+10 vdc @ 25 ma nom
PRICE	\$150.00	\$70.00

C-COR *Min-Econ Amplifiers*

LOW DISTORTION VIDEO AMPLIFIER

This amplifier is a very linear, high-output unit, featuring low distortion.

SPECIFICATIONS

3 db PASSBAND	20 cps to 12 mc
FLATNESS	± 0.5 db, 60 cps to 10 mc
VOLTAGE GAIN	10X, $\pm 10\%$ with 50 ohm source
INPUT IMPEDANCE	4700 ohms, shunted by 8 pf
OUTPUT IMPEDANCE	50 ohms
OUTPUT CAPABILITY	3 volts p-p into 50 ohms, before clipping 2 volts p-p into 50 ohms for 1% THD 5 volts p-p into 75 ohms before clipping 3 volts p-p into 75 ohms for 1% THD
POWER REQUIRED	+25 volts dc $\pm 5\%$, @ 70 ma nom
Model 3582, PRICE	\$80.00



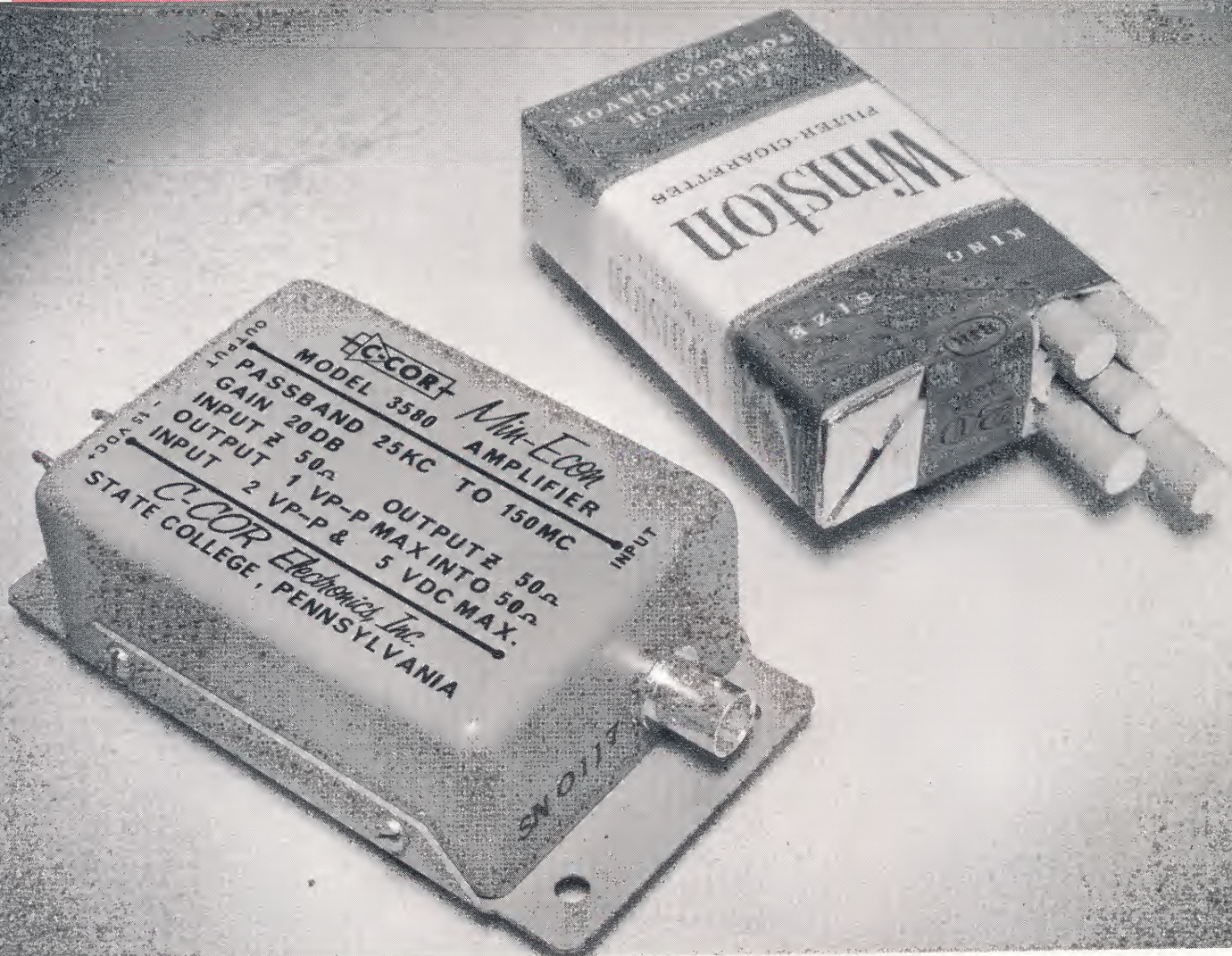
IMPEDANCE TRANSFORMATION UNITS

Applications for low-pass amplifiers frequently arise where a high input impedance is required. C-COR Model 3592 amplifier was designed specifically for this use. It provides an economical means for converting many C-COR amplifiers to high impedance inputs. It is also useful where power gain rather than voltage gain is required. Model 3592A is specifically intended for use with C-COR Model 1319F video amplifier.

SPECIFICATIONS

	Model 3592	Model 3592A
3 db PASSBAND	10 cps to 30 mc, both models	
FLATNESS	± 0.5 db, 10 cps to 10 mc, both models	
VOLTAGE GAIN	Unity (1X) into matched load, both models	
INPUT IMPEDANCE	70 K ohms min, shunted by 6 pf, both models	
OUTPUT IMPEDANCE	50, 75 or 100 ohms (customer specify)	75 ohms
EQUIVALENT INPUT NOISE	100 μ v nominal, both models	
OUTPUT CAPABILITY	1 v p-p into 75 or 100 ohms 0.5 v p-p into 50 ohms	1 v p-p into 75 ohms
DISTORTION	1% THD typical, 10 cps to 10 mc, at rated output, both models	
RISE TIME	20 n sec max, both models	
OVERSHOOT	1% max, both models	
TILT	1% for 60 cps square wave, both models	
POWER REQUIRED	+15 volts dc @ 20 ma nom	+22.5 volts dc @ 20 ma nom
PRICE	\$85.00	\$85.00

- NOTES:**
1. The Model 3592A uses S0239 (UHF) connectors, and is provided with a power cord for powering from the Model 1319F.
 2. Also available is an input impedance of 40 K, 8 pf, providing a voltage gain of 2X. Price \$95.00 total.



COR Min-Econ Amplifiers

ULTRA-STABLE AMPLIFIER

This wide-band feedback amplifier, Model 3589, is designed to give extremely flat response and an ultra-stable gain characteristic over a wide temperature range. It provides a substantial output level, and features a high input impedance with input overload protection. Model 3589, when used in conjunction with a meter rectifying circuit, is particularly well suited as a VTVM amplifier.

SPECIFICATIONS

0.5 db PASSBAND	10 cps to 1.5 mc
FLATNESS	± 0.1 db, 10 cps to 500 kc
VOLTAGE GAIN	100X
INPUT IMPEDANCE	1 megohm, shunted by 35 pf nom.
EQUIVALENT INPUT NOISE	100 μ v rms
OUTPUT CAPABILITY	15 volts p-p up to 500 kc 5 volts p-p above 500 kc
LOAD IMPEDANCE FOR RATED OUTPUT	10 K ohms, shunted by 25 pf
SQUARE WAVE RESPONSE	15% tilt for 60 cps square wave
STABILIZING TIME	5 seconds after power applied
TEMPERATURE RANGE	-55°C to $+65^{\circ}\text{C}$
POWER REQUIRED	+36 volts dc $\pm 5\%$ @ 15 ma nom
Model 3589, PRICE	\$90.00



BANDPASS AMPLIFIERS

Two Min-Econ models are available in the VHF and UHF bands, providing relatively narrow-band units, with low-noise characteristics, for communications work. These are:

Model 3594, covering 100 - 250 mc, and

Model 3584, covering 250 - 500 mc

Either model can be supplied factory aligned to any frequency in its band.

SPECIFICATIONS

3 db BANDWIDTH	nominally 10% of f_c
GAIN	20 db minimum up to 250 mc, 12 db min at 500 mc
OUTPUT CAPABILITY	0.5 volts p-p into 50 ohms (—2 dbm)
INPUT AND OUTPUT IMPEDANCES	50 ohms
INPUT AND OUTPUT VSWR	1.5 to 1 typical
POWER REQUIRED	+ 10 VDC @ 20 ma nominal
NOISE FIGURE	typically 4 db at 250 mc
Model 3594 PRICE	\$150.00
Model 3584 PRICE	\$160.00

To order, specify model number and f_c



HF BAND AMPLIFIERS

This Min-Econ unit covers the entire HF band, broadband, and is optimized for flat response, low distortion, and low noise-figure.

SPECIFICATIONS

3 db PASSBAND	1.5 mc to 35 mc
GAIN	20 db minimum
OUTPUT CAPABILITY AND DISTORTION	1 volt p-p before clipping 0.5 volt p-p at 1% THD (at 5 mc)
INPUT AND OUTPUT IMPEDANCES	50 ohms
INPUT AND OUTPUT VSWR	2 to 1 max across band
NOISE FIGURE	5.5 db max (4.0 db available)
POWER REQUIRED	+10 volts dc @ 30 ma nominal
Model 3583 PRICE	\$75.00
Model 3583A PRICE	\$125.00 (4.0 db NF)



HIGH-LEVEL PREFERRED VIDEO CIRCUITS

Two US Navy preferred circuits are currently available in the Min-Econ package. These are PSC 20 and PSC 19. The first unit, PSC 20, C-COR Model 3585, is intended for CRT intensity modulation, or wherever a large negative pulse is required. PSC 19, C-COR Model 3586, is a non-inverting amplifier useful as a video or general purpose pulse amplifier. Both are linear voltage amplifiers with excellent temperature-gain stability characteristics.

SPECIFICATIONS

	Model 3585	Model 3586
USN PREFERRED CIRCUIT DESIGNATION	PSC 20	PSC 19
3 db PASSBAND (Adjusted for pulse response)	10 cps to 3 mc, both models	
VOLTAGE GAIN	20 X	10 X
LOAD Z FOR RATED GAIN	60 K ohms	20 K ohms
OUTPUT CAPABILITY	55 volts neg. pulse	± 6 volt pulse
LOAD Z FOR RATED OUTPUT	20 K ohms	10 K ohms
INPUT IMPEDANCE	12 K, 40 pf	1 K, 50 pf
OUTPUT IMPEDANCE	1 K nominal, both models	
PULSE RESPONSE — RISE TIME	100 ns max	130 ns
FALL TIME	70 ns	100 ns
OVERSHOOT	5%	10%
DROOP		2% for 100 ns pulse
DELAY		30 ns nom
TEMPERATURE RANGE	-55°C to +125°C, both models	
GAIN VARIATION OVER RATED TEMP RANGE	-10% to +5%	-5% to +3%
POWER REQUIRED	+100 vdc @ 20 ma nom	+25 vdc @ 15 ma nom
PRICE	\$90.00	\$60.00



LOW DISTORTION FEEDBACK AUDIO AMPLIFIER

The C-COR Model 3595 amplifier covers audio and ultrasonic frequencies, and is capable of supplying 1 volt rms across 50 ohms at less than 0.3% THD.

SPECIFICATIONS

3 db PASSBAND	50 cps to 120 kc
FLATNESS	± 0.5 db from 60 cps to 100 kc
VOLTAGE GAIN	10 X min.
EQUIVALENT NOISE AND HUM	20 μ v from 50 ohm source
INPUT IMPEDANCE	5000 ohms, shunted by 10 pf
OUTPUT IMPEDANCE	10 ohms or less to 100 kc
OUTPUT CAPABILITY	1 volt rms into 50 ohms
TOTAL HARMONIC DIST. AT RATED OUTPUT	down 50 db min.
POWER REQUIRED	+15 vdc @ 60 ma nom
Model 3595, PRICE	\$85.00



VIDEO LINE EQUALIZER

The C-COR Model 3593 provides a means for compensating for the characteristic increasing of attenuation with frequency of coaxial cables. The degree of equalization can be adjusted with a single internal control for each particular application. For example, this unit will equalize about 600 feet of RG-11/U coaxial cable to 10 mc.

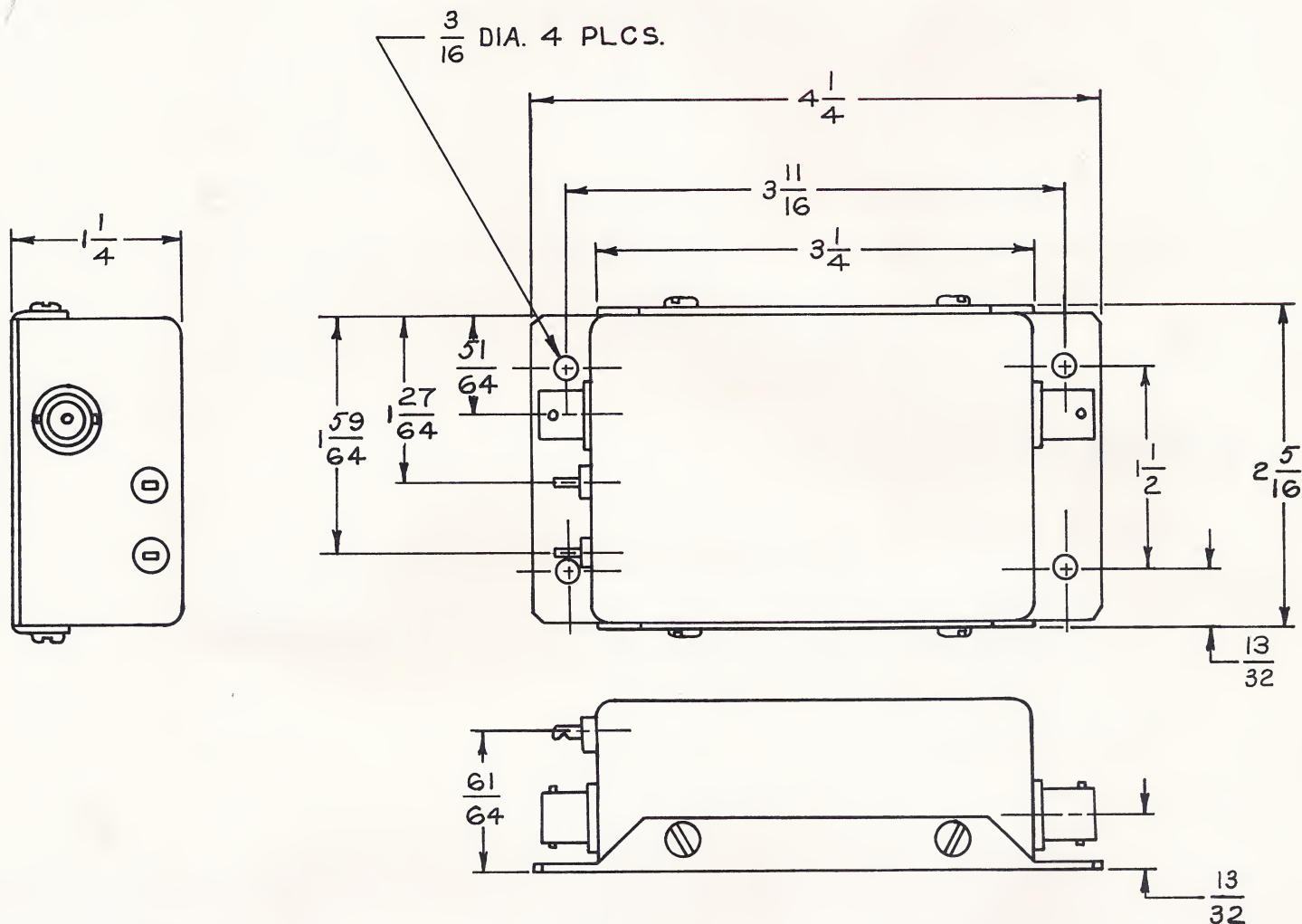
SPECIFICATIONS

3 db PASSBAND	5 cps to 20 mc
FLATNESS	± 0.5 db, 10 cps to 10 mc
GAIN	Nominally 0 db (unity gain) at 1 kc
PASSBAND TILT	Adjustable from flat to +4 db (at 10 mc)
OUTPUT CAPABILITY	1 volt p-p into 75 ohms
INPUT AND OUTPUT Z	75 ohms
TILT	1% max for 60 cps square wave
POWER REQUIRED	-15 volts DC @ 50 ma nominal
PRICE	\$70.00

NOTE: Output is dc coupled, and has approximately 0.75 vdc component.

Min-Econ Amplifiers MECHANICAL DETAILS AND OUTLINE DRAWING

Below is an outline drawing of the Min-Econ package. The case is brass, with a finish of light gray paint, per MIL-E-15090B, Type 3, Class 2, applied over a zinc-chromate primer. Input and output connectors are type BNC. Power is supplied through two feed-through, bypassing solder terminals. Total volume of the Min-Econ package is less than 10 cubic inches, excluding flanges and connectors.



Dimensions Are
Approximate



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May 25, 1966

CURRENT MIN-ECON AMPLIFIERS
and
STANDARD MODIFICATIONS

<u>Model</u>	<u>Use</u>	<u>Elec. Characteristics</u>	<u>Power, Connectors</u>	<u>Price</u>
3580	Wideband Amplifier	Passband: 25 kHz to 150 mHz Gain: 20 db Impedances: 50 ohms	+15 VDC BNC	\$150
3580-A	Wideband Amplifier	Same as 3580	+28 VDC BNC	\$160
3581	Wideband Amplifier	Passband: 20 Hz to 60 mHz Gain: 20 db Impedances: 75 ohms	+10 VDC BNC	\$70
3581-E	Wideband Amplifier	Same as 3581 except 50 ohms	Same	\$75
3581-A	Restricted passband, increased output	Passband: 500 kHz to 30 mHz Gain: 20 db Impedances: 75 ohms Output: 1.5 V p-p	Same	\$85
3581-B	Reduced low fre- quency response	Passband: 10 mHz to 60 mHz, ± 0.5 db Down 30 db at 100 kHz Gain: 20 db Impedances: 75 ohms VSWR: 1.5:1	Same	\$80
4581-4	Multiple output Wideband Amplifier	Four Model 3581 in instrument case, with regulated power supply	105-125 V 50-400 cps BNC	\$480
3581-F	Very Flat Wideband Amplifier	Passband: Same as 3581 except $\pm .2$ db flatness, 20 mHz to 50 mHz	+10 VDC BNC	\$90
3581-D	Increased gain	Passband: 1 kHz to 5 mHz ± 1 db Gain: 30 db Impedances: 150 ohms in 75 ohms out Noise Figure: 10 db	Same	\$90

CURRENT MIN-ECON AMPLIFIERS
AND
STANDARD MODIFICATIONS

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<u>Model</u>	<u>Use</u>	<u>Elec. Characteristics</u>	<u>Power, Connectors</u>	<u>Price</u>
3582	Low Distortion Video Amp	Passband: 20 Hz to 12 mHz Gain: 10X Impedances: 4700 ohms in 50 ohms out Distortion: 1% for 3 V p-p out	+25 V BNC	\$80
3582-A	Restricted Bandpass	Passband: 1 kHz to 4 mHz Gain: 30X	+28 V	\$90
3583	Low Noise 2 to 30 mHz Amplifier	Passband: 1.5 mHz to 35 mHz Gain: 20 db Impedances: 50 ohms Noise Figure: 5.5 db max.	+10 V BNC	\$75
3583-A	Lower Noise	Same as 3583 except noise figure 4 db max.	Same	\$125
3584	Low Noise UHF Preamp	Center freq: 250 to 500 mHz Bandwidth: 10% nominal Gain: 15 to 20 db Noise Figure: 4 db Impedances: 50 ohms	+15 V BNC	\$160
3584-X	Same as 3584 with tighter specifications	Same basic specifications as 3584. Gain to 27 db; noise figure to 2.5 db; bandwidth to 3%; VSWR to 1:2/1	+15 V BNC	\$300 to \$500 Typical
3585	Pulse and Video Amplifier	USN preferred CKT PSC 20 Gain: 20X, neg pulse only Output: 55 V peak Rise Time: 100 ns Fall Time: 70 ns Impedances: 12 K in, 1 K out	+100 VDC BNC	\$90
3586	Pulse and Video Amplifier	USN preferred CKT PSC 19 Gain: 10X pos. or neg. Output: ± 6 volt peak Rise Time: 130 ns Fall Time: 100 ns	+25 VDC BNC	\$60
3587-A	High Level Pulse Amplifier (Non-inverting)	Gain: 10 to 250X (Variable) Output: 25 V pos. pulse Rise Time: Less than 125 ns Pulse Width: 250 ns max. Rep Rate: 300 kHz (Useful for modulating Fairchild scope)	+50 VDC BNC	\$80

CURRENT MIN-ECON AMPLIFIERS
AND
STANDARD MODIFICATIONS

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<u>Model</u>	<u>Use</u>	<u>Elec. Characteristics</u>	<u>Power, Connectors</u>	<u>Price</u>
3587-B	High Level Pulse Amplifier (Inverting)	Gain: .8 to 4X Output: 20 volt pos. pulse Rise Time: Less than 30 ns Width: 390 ns max. Rep Rate: 30 kHz	+50 VDC BNC	\$80
3589	Ultra-stable Feedback Amplifier	Passband: 10 Hz to 1.5 mHz Gain: 100X Impedance: 1 meg. in; 100 ohms out	-36 VDC BNC	\$90
3589-A	Same as 3589	Output: 15 V p-p into 10 K	-28 VDC BNC	\$85
3592	Impedance Transforming Video Amp	Passband: 10 Hz to 30 mHz Gain: Unity Impedances: 70K in, 50 out Output: 1 V p-p, 1% THD	+15 VDC BNC	\$85
3592-A	Same as 3592	Same as 3592, except adapted as Preamp for C-COR 1319-F	+22.5 V UHF	\$85
3592-B	Similar to 3592	Same as 3592, except inverts input signals	+15 VDC	\$95
3592-D	Same as 3592	Same as 3592	+24 VDC BNC	\$85
3593	Video Amplifier with adjustable cable equalization	Passband: 5 Hz to 20 mHz Gain: 0 db Equalization: 0 to 4 db @ 10 mHz Impedances: 75 ohms Output: 1 V p-p	-15 VDC BNC	\$70
3593-A	Same as 3593	Same as 3593 except 3 V p-p output. 0.3° max. diff. phase at 1 V p-p	+24 VDC BNC	\$90
3594	VHF Low Noise Preamplifier	Center Frequency: 100 to 250 mHz Bandwidth: 5% nominal Gain: 20 db nominal Noise Figure: 3.5 db Impedances: 50 ohms	+10 VDC BNC	\$150
3594-A	VHF Low Noise Preamplifier	Same as 3594, except gain 30 db nominal	+15 VDC BNC	\$160

CURRENT MIN-ECON AMPLIFIERS
AND
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<u>Model</u>	<u>Use</u>	<u>Elec. Characteristics</u>	<u>Power, Connectors</u>	<u>Price</u>
3594-X	VHF Low Noise Preamplifier	3594 with tightened specifications. VSWR to 1.2/1; N.F. to 2.5 db; bandwidth to 3%	+15 VDC BNC	\$300 to \$500 Typical
3595	Low Distortion Amplifier. Audio and Ultrasonic Frequencies	Gain: 10X Passband: 50 Hz to 120 kHz Impedances: 5000 ohms in 10 ohms out Output: 1 V RMS for 1% THD	+15 VDC BNC	\$85
3596	Ultra Wideband Amplifier	Passband: 8 mHz to 300 mHz Gain: 20 db nominal Impedances: 50 ohms Output: 1 V p-p	+15 VDC BNC	\$175
3596-A	Narrow Pulse	Similar to 3596 except response to 100 kHz and aligned for pulse response rise time: 2 ns, $\pm .5$ V peak.	+15 VDC BNC	\$195
3597	Low Noise Video Amplifier for Detector Use	Passband: 300 Hz to 2.5 mHz Volt gain: 100 X Noise Figure: 2 db with 2000 ohm source Impedance: 20 K approx. input, 35 ohms out Output: ± 1 V peak across 1 meg.	-15 VDC BNC	\$125
3599-X	Broadband Amplifier, 100 Hz to 30 mHz with internal filter to produce a variety of custom bandpass characteristics.	Typical specifications: Gain: 8 to 10 db adjustable Impedance: 75 ohms Filter: Bandpass, 14 mHz to 16 mHz, sharp cutoff Output: 2 V p-p matched 4 V p-p low impedance	+12 VDC BNC	\$100 Basic Amp. \$130 with filter



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June 13, 1966

Dear Customer:

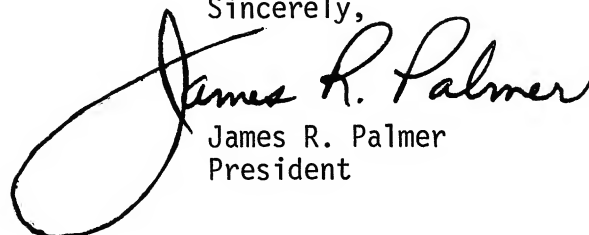
C-COR's Min-Econ amplifiers have made a great hit with you. These small economical units, with their shipment the-same-day-you-call-your-order-in, have been very popular.

The original list of 14 amplifier circuits in the Min-Econ package has been increased to 17 amplifiers. Further, there have been many minor modifications, such as a change in impedance, or connectors, or supply voltage, to meet a customer's specific requirement. All of these amplifiers and these standard modifications are listed on the attached sheets for your information, with brief specifications and prices.

Prices vary from \$60 to \$195 for most of these units.

C-COR means AMPLIFIERS and AMPLIFIERS mean C-COR. If the amplifier you need is not listed here, or in EEM, pps. 508 to 509, remember that C-COR specializes in specials.

Sincerely,



James R. Palmer
President

JRP:mh

Enclosures